Exercises:

1. Perform a function that defines two matrices, the matrix x and its transpose; the function has to sum both matrices

Example. x = $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$

2. Perform a function that defines two matrices, matrix A and B; check if there is any common number. If so, replace it with the value -1.

A = $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$ B = $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

3. Create a function called "sumMatrix". The function has to sum the matrix by row and insert the result into a vector called "RowSum"; and the sum by columns and it will insert in a vector that is called “SumColumns”

4. Define a function that creates a vector A, for example, A = (2,4,5,7); you create another vector B, for example B = (1,2,3,6,8). The function must create two resulting vectors, one vector that returns the matching numbers and in others the non-matching numbers. Both vectors must be ordered from the least to the greatest. There should be no repeated numbers in the vectors. Res1 = (2); Res = (1,3,4,5,6,7,8).

a) Using sort()

b) Not using sort()

5. Define a function that creates a vector A, for example, A = (2,4,5,7); you create another vector B, for example B = (1,2,3,6,8). The function must create two resulting vectors, one vector that returns the even numbers and in others the odd numbers. Both vectors must be ordered from the highest to the lowest. If there are matching numbers, it will only appear once in the resulting vector. Res1 = (8,6,4,2); Res = (7,5,3,1)

6. Define a function that creates a vector A ordered from the least to the greatest, for example, A =(2,4,5,7); ask for a number by keyboard that is between the minimum number of the vector and the maximum; in the example it would be 2 and 7; check if the number keyboard input exists in vector; if it does not exist you must insert it in the correct position, in order from the least to the greatest:

a) using the sort ().

b) without using the sort ().

8.Create a "Hit" function. The function must create a vector, for example A =(2,3,6,1,7,1). Next you must create a matrix with “*”, as many numbers as in the vector A. The function must request numbers (between 1 and 10) from the user by keyboard. It must check if that number exists in the vector, if it does exists you must put it in the place of the number an "*" and insert the number in the matrix.

a) The user can enter as many numbers as elements in the vector A.

b) The user must enter numbers until there is no “*” in the matrix

9. Define a function that creates a vector A ordered from the least to the greatest, for example, A =(2,4,5,7); ask for a number by keyboard that is between the minimum number of the vector and the maximum; in the example it would be 2 and 7; check if the number keyboard input exists in vector; if it does not exist you must insert it in the correct position, in order from the least to the greatest:

a) using the sort ().

b) without using the sort ().

10. Write a function in order to add two vectors. If the result is over nine you must use carry arithmetic. You must use a matrix to place the vectors and the result.

Example:

Vectors:

A=(1,7,6,8)
B=(4,8,7)

Result:

1	7	6	8
	4	8	7
2	2	5	5

11. Write a function that inserts two vectors in a data structure that allows us to have:

- in the first column the numbers of both vectors;
- in the second column if the number is repeated or not
- in the third column the number of times it appears.

The numbers in the structure have to be ordered from the least to the greatest. You must not use “sort”.

Example:

Vectors:

B=(2,1,4,8,7,8)
C=(1,7,6,8)

Result:

Number	Repeated	Times
1	YES	2
2	NOT	1
4	NOT	1
6	NOT	1
7	YES	2
8	YES	3

12. Create a function called “Dates”. This function has to ask a current date by keyboard (day, month and year, as you can see in the examples) and it has to provide the next date.

Example 1:	
Day:5 Month: 8 Year:2019	Next date is: 8-6-2019
Example 2:	
Day:31 Month: 12 Year:2019	Next date is: 1-1-2020

13.Create a function called “Magic-Square”. This function has to check if a matrix is a magic square. A matrix is a magic-square when the sum of rows, columns, main diagonal and secondary diagonal is the same.

$$A=\begin{pmatrix} 4 & 9 & 2 \\ 3 & 5 & 7 \\ 8 & 1 & 6 \end{pmatrix}$$

14. Given two matrixes, write in a vector called “row” numbers that matched in the rows; and in another vector called “column” write numbers that matched in the columns.
You mustn’t use the for loop

$$A=\begin{pmatrix} 4 & 9 & 2 \\ 3 & 5 & 7 \\ 1 & 6 & 8 \end{pmatrix} \qquad B=\begin{pmatrix} 1 & 9 & 2 \\ 8 & 1 & 6 \\ 3 & 1 & 6 \end{pmatrix}$$

Row: 9,2,1,6
Columns: 1,3,9,2